

Options for Clean Water Solutions for the San Carlos Apache Tribe, Arizona



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The San Carlos Apache Tribe’s Options for Clean Water Solutions

The San Carlos Apache Reservation in eastern Arizona has approximately 10,200 residents. The traditional lands of the Apache Nnee (“the People”) once extended from Texas through New Mexico and Arizona into Mexico and California; however, during the 19th century, many bands of the Apache were relocated to reservations. The San Carlos Apache Reservation was established in 1871.

Residents of the San Carlos Apache Reservation currently have inadequate wastewater treatment services. For many years, Tribal leaders have worked to change this situation. With the passage of the Bipartisan Infrastructure Law and new Water Technical Assistance services, there is momentum to bring wastewater treatment solutions to homes on the San Carlos Apache Reservation. This document describes technical options and financial resources for wastewater treatment. It is the product of the combined efforts of many organizations and individuals and provides options for clean water solutions for the Reservation.

Closing America's Wastewater Access Gap Community Initiative Pilot: EPA/USDA-RD Partnership

Introduction

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture Rural Development (USDA-RD) partnered with six states and three Tribes (two federally recognized and one state-recognized) on the Closing America's Wastewater Access Gap Community Initiative. As a pilot program, this initiative was the first of its kind for EPA and USDA-RD. This initiative provides technical assistance to support capacity to improve wastewater management for the 11 participating communities. EPA and USDA have grant and loan programs to help pay for wastewater system improvements. Recent increases in federal funding offer an opportunity for communities to invest in septic upgrades, connect to nearby treatment systems, or build new sewer and wastewater treatment systems that meet their needs.

EPA offers a range of Water Technical Assistance (WaterTA) for communities to identify water challenges and solutions, build capacity, and develop application materials to access water infrastructure funding. EPA collaborates with states, Tribes, territories, community partners, and other stakeholders to implement WaterTA efforts. The result: more communities apply for federal funding to support quality water infrastructure and reliable water services. Communities can learn more about EPA WaterTA and how to indicate interest in receiving assistance by visiting EPA's WaterTA website.¹

USDA offers a wide range of water and wastewater assistance for rural communities to obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems. USDA's Water and Waste Disposal Technical Assistance and Training Grants program helps qualified, private nonprofits provide technical assistance and training to identify and evaluate solutions to water and waste problems. It also helps applicants prepare applications for water and waste disposal loans and grants, and it helps associations improve the operation and maintenance (O&M) of water and waste facilities in eligible rural areas with populations of 10,000 or fewer. Communities can learn more about USDA Water and Waste Disposal Technical Assistance and Training Grants and how to indicate interest in receiving assistance by visiting USDA's website.²

Purpose

EPA and USDA-RD pilot program staff members worked with the pilot program team—the San Carlos Apache Department of Environmental Protection (DEP); Indian Health Services (IHS) officials; and local technical assistance providers Southwest Environmental Finance Center (SW EFC), Environmental Finance Center West (EFC West), and Moonshot Missions—to develop solutions for the San Carlos Apache Tribe's wastewater issues. This document, *Options for Clean Water Solutions for the San Carlos Apache Tribe, Arizona*, outlines potential solutions to address the needs for improved wastewater treatment approaches on the San Carlos Apache Reservation. Residents and Tribal leadership can use this information to estimate costs and select a wastewater solution that meets today's challenges and helps the Tribe thrive.

¹ <https://www.epa.gov/waterta>

² <https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-technical-assistance-training-grants>

Over the past year, the pilot program team has:

1. **Conducted a community wastewater assessment.** The pilot program team reviewed existing information on wastewater systems on the San Carlos Apache Reservation and found areas that need improvement. This review included collecting information on septic systems with documented issues, as well as integrating IHS information on connections to the central sewer.
2. **Identified wastewater solutions.** The team identified wastewater solutions and estimated their costs. They considered the Tribe's long-term needs and outlined a path to apply for funding. State and Tribal officials played a key role in developing these options. The team made recommendations beyond technical solutions to prevent future septic system failures, including the development of a wastewater management ordinance and a wastewater information coordinator position, as well as a focus on reducing water use. These are challenging but important tasks for local governments to complete. The steps for completing these tasks are included in this report, and the TA providers will assist with their implementation.
3. **Helped communities find and apply for funding opportunities.** This document outlines federal funding sources and how to apply for funding. It also shows how to pay for construction and long-term costs. The team worked with IHS to inventory individual systems in need of repair and match them to the appropriate funding source.
4. **Developed a plan to pay for ongoing costs.** To implement the wastewater solutions proposed in this document, the San Carlos Apache Tribe will have to develop a plan to pay for construction and ongoing costs. These costs could include management, operations, maintenance, and any potential construction loan repayments. This document offers ideas to get started, such as customer assistance program strategies and non-rate revenue programs that other utilities have used.



The San Carlos Apache Tribe

The San Carlos Apache Indian Reservation in central southeastern Arizona covers 1.8 million acres in Gila, Graham, and Pinal counties. The traditional Apache homeland included a vast region stretching from what is now Texas through New Mexico and Arizona into Mexico and California. In 1871, the U.S. government established the San Carlos Apache Reservation to confine many bands of Apache and remove them from their traditional homelands. Forced relocation, compounded by assimilation and adverse interactions with the federal government, resulted in decades of issues and persistent poverty for members of the Tribe. Despite these setbacks, the Tribe has made significant investments in the Reservation, which has seen steady population growth over the past decade. Figure 1 shows the Reservation's location, with dots indicating occupied homes.

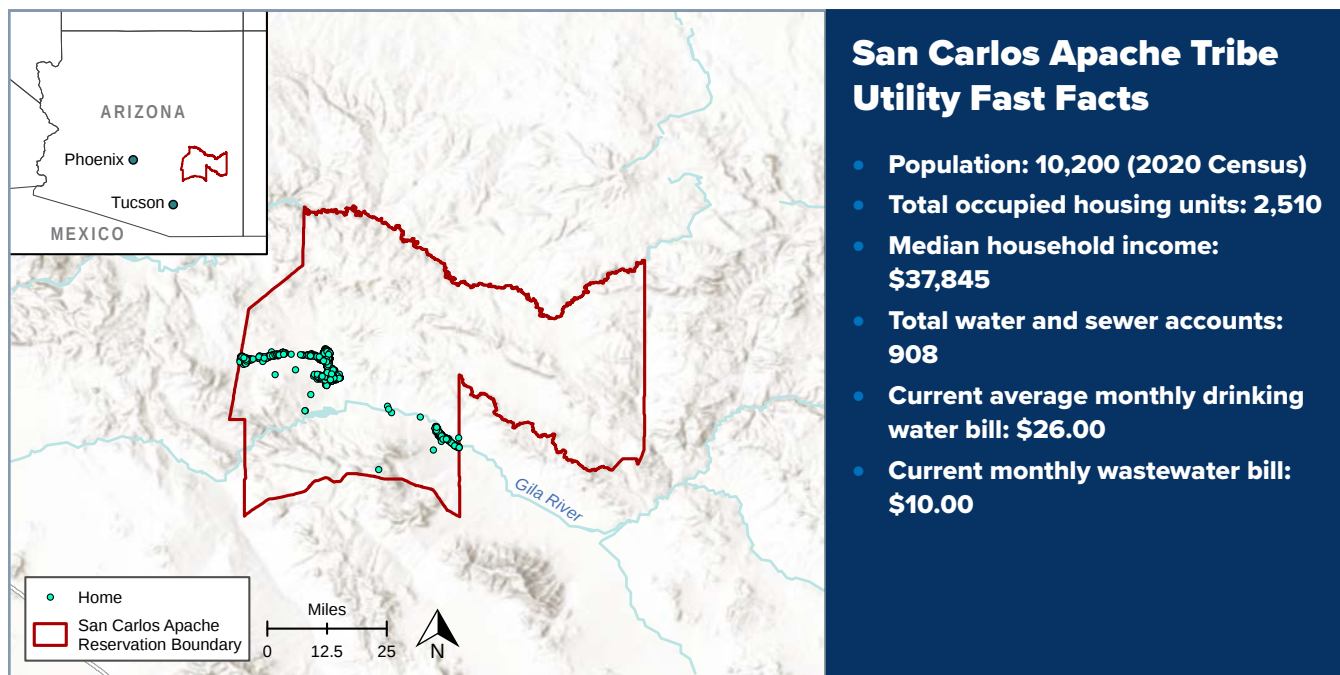


Figure 1. Location of the San Carlos Apache Reservation.



The number of homes that have failing septic systems or even lack access to indoor plumbing is concerning, and the road to receive funding is lined with hurdles.

— Christy Sangster-Begay, Director, San Carlos Apache Tribe
Department of Environmental Protection

Much of the Reservation's population is located within five Tribally defined districts (Figure 2). The population of the Reservation is approximately 10,200 as of the 2020 Census. Tribal registrations continue to increase, with many Tribal members moving back to the Reservation after working elsewhere.

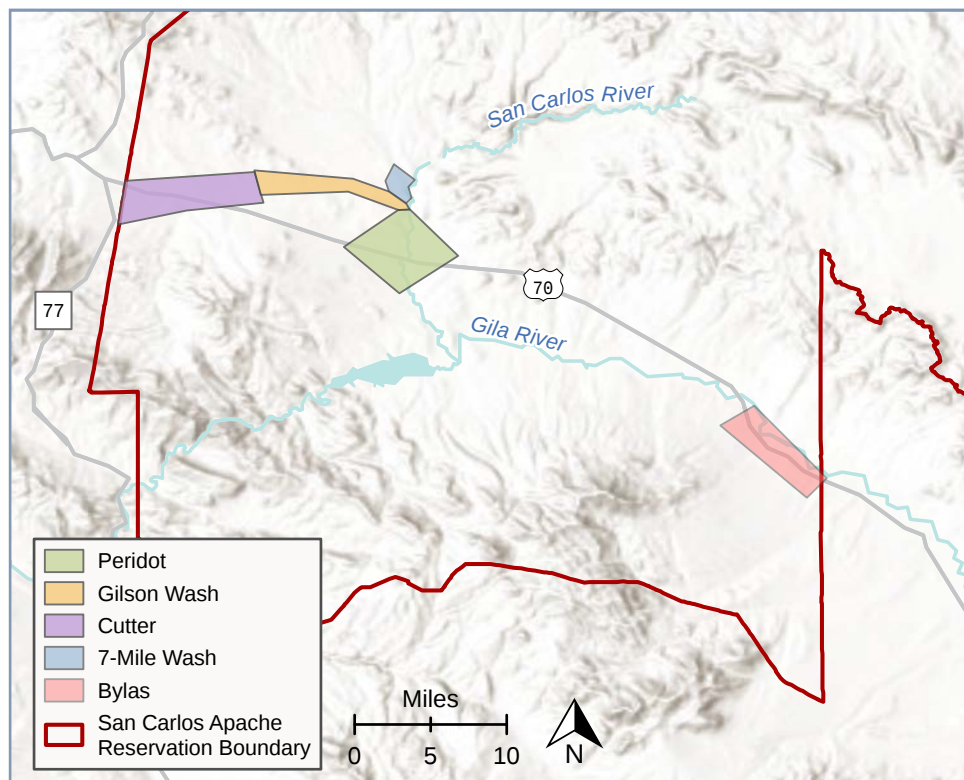


Figure 2. District boundaries within the San Carlos Apache Reservation.

The Potential of Infrastructure Investment

San Carlos Apache Tribe members have expressed support for capital investment in sanitation infrastructure, and they understand that monthly bills are necessary for maintenance of infrastructure. They want a community where their children can safely play in their backyards without risking exposure to untreated wastewater. An affordable wastewater system is key to maintaining a vibrant, productive community.

One of the major challenges with providing wastewater services is the vast and very rural area of the Reservation. Traditional centralized infrastructure is not an appropriate fit for all the dwellings and other buildings on the Reservation, particularly when homes are spread out over a large geographical area. Of the estimated 2,510 occupied housing units on the Reservation (from the 2020 Census estimates), just over one-third are served by the centralized water and sewer systems operated by the Water Distribution and Wastewater Treatment Facilities Program (WDWTFP). The WDWTFP is a branch of Tribal government within the general manager's office. Onsite systems, whether constructed by IHS, the Tribal Housing Authority, or private firms, serve roughly two-thirds of the Reservation's homes and a few nonresidential properties. Many of these systems are known to have functional problems, and some occupied homes lack improved wastewater service altogether. Homes with onsite systems have standard septic tanks and drainfield systems, either built under direction of IHS or funded when the home was constructed using U.S. Department of Housing and Urban Development (HUD) funds.

In 2019, the DEP conducted a sanitary survey of approximately 750 septic systems on the Reservation. The survey revealed significant failures associated with 35 systems, with "no sewer" reported for another 24 sites. While most of the densely settled parts of the Reservation are served by the conventional gravity sewer collection system, both the septic survey and outreach conducted through this pilot revealed many homes with poorly functioning

onsite systems and several homes without any improved water or sanitation. While federal funding sources can fund onsite system repair or replacement, multiple communication, eligibility, and coordination barriers have prevented the Tribe from fully using these funds to address wastewater system deficiencies.

Community Engagement Feedback

Throughout the 1-year period of the pilot project, Tribal officials from the DEP expressed that it was important for the project team to make in-person visits to the Reservation. Community engagement was a key element to gaining the Tribe's trust and collecting information critical to developing the options outlined in this report. The project team traveled to the Reservation in November 2022—as well as in March, June, September, and December 2023—to hold meetings, deliver presentations, talk with community members, and conduct home site visits. The project team acquired appropriate permits for visiting all locations. These site visits created better communication between the federal partners and community contacts and improved the comprehensiveness of this report.

During the November 2022 visit, the San Carlos Apache Tribe, EPA, and USDA-RD held a kickoff meeting to learn more about the wastewater challenges facing the Reservation. Key points addressed during this meeting included issues related to septic system construction and repairs, as well as the significant workforce and equipment needs for septic maintenance on the Reservation. The Tribe also expressed a need for increased funding for the centralized wastewater system.

In March 2023, EPA staff presented to the Tribal Council on the initiative. Key feedback and priorities that the Tribal Council conveyed to EPA included the following:

- At present, the San Carlos River receives raw wastewater discharges from the centralized wastewater system due to the wastewater treatment lagoons being overloaded and the risk of compromising the dikes. While a planned system upgrade by IHS should address this issue, declines in water quality have affected Tribal members' use of the river. Additionally, the river receives an excessive amount of solid waste from surface water runoff and illegal dumping. Restoration and cleanup efforts beyond the wastewater upgrade are necessary.
- Solid waste infrastructure on the Reservation needs financial investment and enhancements. Currently, the Reservation does not have a landfill—only a single transfer station that is overloaded with waste. Community members do not have sufficient funds to haul solid waste, and solid waste trucks are routinely stressed and damaged by poor-quality roads.
- Homeowner education on proper septic system management and maintenance (especially keeping fats, oils, and grease out of drains and reducing water use) is key to solving the Tribe's septic system issues. The Tribal Council suggested that educational booths and surveys were useful tools for educating the community. Other issues that homeowner education could address include a lack of awareness on available pumping services, infrequent pumping due to costs, and stress on septic systems from homes that have more inhabitants than the septic systems are designed to handle. The Tribal DEP regularly engages in community outreach initiatives, such as Earth Week events (Figure 3), to foster environmental awareness. Over the course of this project, the DEP expressed willingness to promote septic system education among Tribal residents.



Figure 3. The San Carlos Apache Tribe's 2023 Earth Week flyer.

- The Tribal Council would like to construct additional housing and expand the wastewater lagoon's capacity to accommodate the Reservation's projected population growth.
- The Tribal Council approved the project team's request to view the IHS-prepared Preliminary Engineering Report (PER) for the planned wastewater treatment facility expansion, and to receive the geographic information system (GIS) files showing utility sewer lines and building connections.

The project team delivered two presentations to the Tribe's DEP Committee, which is made up of leadership from the various Tribal departments and the Tribal vice chairman. An in-person presentation summarizing the community wastewater assessment was delivered on June 29, 2023, and another presentation on the solutions plan was delivered on September 27, 2023.

Wastewater Treatment Options for the San Carlos Apache Tribe

After completing an assessment of the San Carlos Apache Tribe's wastewater infrastructure, the project team analyzed options to reduce the number of failing onsite systems on the Reservation. The Tribal DEP's preferred option is the Wastewater Treatment Improvement Plan, which compiles recommendations for the central sewer system, onsite systems, wastewater management, and water and wastewater governance. The Tribal DEP has indicated that they would like to work with IHS, EPA, and USDA to pursue funding. The DEP worked extensively with the project team to organize known information on wastewater services and is interested in enhancing their coordination of wastewater information while moving forward with the development of a wastewater management ordinance. Should the Tribe choose not to move forward with the Wastewater Treatment Improvement Plan, the project team has outlined a no-action alternative. This option details the Tribe's current strategies to address the failing systems, as well as the predicted outcomes of not pursuing funding for homeowners or the wastewater utility and not enacting wastewater management policy changes.

No-Action Alternative

If the Tribe does not undertake any of the new wastewater management actions identified in the Wastewater Treatment Improvement Plan, property owners would continue to have primary and independent responsibility for maintenance, repair, and replacement of onsite septic systems. Costs for operations, maintenance, and replacement would include tank pumping roughly every 5 years, replacing pumps and motors roughly every 10 years, and replacing drainfields roughly every 20 years.

Proposed wastewater information management actions would also be affected by the no-action alternative. If the Tribe does not develop a system for maintaining and updating information about wastewater service at each occupied structure, property owners who need financial assistance would have to navigate the application process for USDA-RD funding on their own. Property owners would also have to understand eligibility requirements related to USDA-RD funding. Those eligible for IHS funding would need to contact responsible parties at the Tribe and IHS to be added to the IHS Sanitary Deficiency System (SDS) list. The IHS SDS is an inventory of projects that is intended to address existing sanitation deficiencies on Tribal land. EPA uses the SDS list to determine their project priorities for the Clean Water Indian Set-Aside (CWISA) funds. Houses must be in "like new" physical condition to be eligible for IHS SDS funding. The Tribe would not have the base of information needed to make a strong, competitive application for available funds (such as Section 319 Nonpoint Source grants) that could close funding gaps or support information campaigns. Finally, occupied properties without wastewater service would continue to be identified only on a periodic or case-by-case basis when problems arise, eliminating the potential for proactive outreach and funding strategies.

A lack of permits for wastewater system installation and repair and the absence of standards for design and installation have been shown to cause system malfunctions and failures. Without standards, property owners and the Tribe will continue to face design- and installation-related failures and their associated costs. It is also likely that without an education campaign, excessive water use and the disposal of household cooking oil and other substances into septic systems will continue. These actions increase the risk of septic system malfunction or failure, jeopardizing individual households' health and the vitality of the Reservation.

The consequences of the no-action alternative would likely continue or exacerbate ongoing challenges in the funding, management, and maintenance of systems on the Reservation.

Implement Wastewater Treatment Improvement Plan

The broad geographic distribution of homes and neighborhoods on the San Carlos Apache Reservation means that the Tribe will have to rely on a mix of central sewer and individual or clustered onsite systems, each of which has different funding and management needs. The set of actions outlined in the Wastewater Treatment Improvement Plan provides a path toward sustainable management of all types and scales of wastewater service. The improvement plan addresses the Tribe's immediate sanitation system needs and includes recommendations for building a policy framework for sound management and sufficient financial resources.

The Wastewater Treatment Improvement Plan consists of five components, shown in Table 1.

Table 1. Components Addressing Financial and Operational Needs in the Near-Term and Future

Component	Capital Costs	Non-Capital Costs
1. Fully fund the planned central sewer system upgrade project	✓	
2. Install, fix, and repair onsite septic systems	✓	
3. Improve wastewater information coordination		✓
4. Develop an active education and outreach program promoting improved maintenance and connecting residents to available resources		✓
5. Reinvigorate wastewater and water governance structures, and update rates		✓

Implementing any component would involve new investments of money, staff time, and community capital. Each component involves choices affecting the balance of responsibility for wastewater management and funding among septic system owners, central sewer customers, and the Tribal government. A central sewer system upgrade (Component 1) has advanced through planning stages and will likely be implemented, which will benefit homeowners and surface waters. This upgrade includes the purchase of a new pumper truck for the WDWTFP and the connection of 32 homes with failing onsite systems to the centralized system.

The expanded sewer system and new pumper truck will require new investments in maintenance and management, as will the other four elements of the plan. As outlined under the no-action alternative, if the additional elements in the plan are not implemented, financial resources will continue to be limited for central sewer and onsite management. More importantly, responsibility for onsite wastewater systems will stay with property owners financially and administratively, which will likely perpetuate many of the challenges observed in the community during this pilot. Addressing financial challenges for property owners also helps address the WDWTFP's long-term needs for the central sewer system, as the central sewer system will need sufficient customer revenue from property owners for its continued function.

Components 2 through 4 are intended to balance financial and management responsibility effectively and efficiently among the parties involved in the Tribe's wastewater services. These include the WDWTFP and government, state and federal funders, technical assistance providers, contractors, and property owners.

IHS has identified homes that need to repair documented failing onsite systems. Technical assistance providers and Tribal partners are developing a community education campaign to improve stewardship of water and septic systems. The education campaign will emphasize connecting residents to local leaders and septic professionals who can effectively troubleshoot ongoing problems and give residents the tools to prevent future issues through water conservation, managing cooking oils, and protecting their septic drainfields and lids from damage. This report includes recommendations on how to improve utility management, governance, and information management to connect residents to education and financial resources, promote water conservation, and bring in sufficient revenue for effective O&M. Total costs for the recommended capital improvements are listed in Table 2.

Table 2. Total Capital Project Costs

Component	Cost
1. Fully fund the planned central sewer system upgrade project	\$34,087,000
2. Install, repair, or replace onsite systems (70 homes)	\$2,453,000

Component 1: Fully Fund Planned Central Sewer System (Lagoon) Upgrade Project

A foundational solution for the Tribe is to complete the planned upgrade and expansion of the existing central sewer system. The upgrade is intended to eliminate an existing point source discharge into the San Carlos River. The project also will provide a new pumper truck for the WDWTFP. IHS has prepared a PER for the lagoon system upgrade (*PER for the San Carlos Regional Wastewater Treatment Facility, December 2022*).

The planned new wastewater treatment system consists of two 18.6-acre facultative lagoons with impervious liners, followed by two 18.6-acre unlined disposal ponds with infiltration into the subsurface. The project also involves yard piping, with sanitary sewer manholes and site fencing. The ultimate design flow is 1.4 million gallons per day (gpd). Infiltration ponds eliminate the current point source discharge into the San Carlos River and allow infiltration and further soil treatment of the lagoon effluent as it returns to the hydrologic cycle. This design requires no electrical power downstream of the sewer lift station. The additional estimated O&M cost of the system is \$4,025 per year, adding a minimal 0.4 percent increase to the Tribe's current O&M costs.

The plan recommends purchasing a new pumper truck for use by the WDWTFP. However, because the WDWTFP faces staffing shortages, the utility would need to identify additional funding to support training and full operation of the pumper truck.

The estimated cost of the treatment system and sanitary sewer extension is \$34,087,000. As shown in Table 3, IHS has committed funding for \$23,786,713, the full amount of IHS-eligible cost. EPA Region 9 has contributed \$5,714,817 in CWISA funds. The project needs an additional \$4,585,470 in funding.

Through IHS, Connect Properties on Douglas Road in Bylas to the Central Sewer System

IHS is working on a plan to evaluate and connect a group of roughly 25 properties along Douglas Road in the Bylas District to the central sewer system. The homes in this area are served by a mix of onsite wastewater systems and a failing 2,700-foot, 4-inch variable grade sewer system. The project team evaluated this area for a cluster system; however, based on the best professional judgment of the engineering team and IHS, cluster systems are not an effective alternative and sewerage is recommended. An approximately 3,100-foot, 8-inch PVC sewer main extension is proposed to provide homes in this area with sewer service. At the time of writing, IHS

entered this sewer main extension into the IHS SDS as part of a larger \$2.45 million project to address failing onsite wastewater systems throughout the Reservation. If funded through the fiscal year 2024 SDS cycle, funds would be available for this project beginning in September 2024. Additional information regarding this project is in Component 2 of this report.

Estimated Costs for Funding the Central Sewer System Expansion and Upgrade

The total project cost would be \$34,087,000 (capital cost identified in the PER).

Table 3. Project Costs for the Approved Central Sewer System Expansion and Upgrade

Funding Amount	Funder
\$23,786,713	IHS (committed)
\$5,714,817	EPA Region 9 (committed)
\$4,585,470	Arizona Clean Water State Revolving Fund (CWSRF), USDA, EPA Region 9 (potential)

Current Rates and Revenues

Financial information on current rates was very limited. Information in the IHS PER indicates that charges for water and sewer are about \$36 per month for residential users, with \$10 allocated to sewer. Commercial users pay a flat rate of \$110 per month. Table 4 shows \$110 per month for water, sewer, or both. The annual estimated revenues to the WDWTFP are approximately \$515,000. A water rate study is under development by Stetson Engineers and will be completed in 2024.

Table 4. User Accounts and Charges, October 2022

User Type	Number of Accounts	Monthly Water	Monthly Sewer	Estimated Water Sewer Revenue Before Exemptions
Residential	908	\$26	\$10	\$32,688/month; \$392,256/year
Commercial	93	\$110 flat rate (water/sewer/both)	Part of water rate	\$10,230/month; \$122,760/year
Total Revenue	\$515,016/year			

Source: IHS PER

Component 2: Install, Repair, or Replace Onsite Systems

The soil and site conditions on the San Carlos Apache Reservation are suited for onsite wastewater systems. Soils are sandy and well-drained. The average annual rainfall is approximately 14 inches per year. The mean annual evaporation in the southeastern part of Arizona is approximately 80 inches. In this climate and soil regime, properly installed, managed, and maintained onsite wastewater systems perform well and represent a viable, sustainable method of wastewater treatment and dispersal.

However, action and investment are necessary to address problems that have led to poorly functioning or actively failing septic systems. Reports from Tribal members during the project team’s site visits, as well as the 2019 *Survey of Leaking Septic Systems as Potential Pollution Sources to Public Water Systems on the San Carlos Apache*

Reservation, cite several causes for septic system malfunctions and failures. Septic system backups into homes are primarily caused by residents pouring cooking fats down kitchen drains. The fats enter the inlet baffle of the septic tank and congeal, collecting additional materials such as paper and other sewage and blocking water from entering the tank. The blocked inlet baffle causes sewage to back up into the home. In these cases, the soil dispersal system (drainfield) may be in good condition, but plumbing intervention is required to reestablish function.

Another cause of septic system malfunction is hydraulic overloading, where more water is used in the home than the system can handle, overloading the tank and the soil drainfield. Water records indicate significantly higher water use per dwelling unit on the Reservation than would be expected based on population and dwelling unit size. A wastewater flow study conducted in 2019, *Wastewater Flow Study for the San Carlos Apache Tribe on the San Carlos Reservation in Gila and Graham County, Arizona*, reported that in some sub-basins of the sanitary sewer system, daily flows exceeded 2,500 gpd per equivalent dwelling unit (i.e., the equivalent of one single family residence). This figure is more than 3.5 times the expected average wastewater flow (540 gpd per equivalent dwelling unit). The wastewater flow entering the sewer did not include outdoor water use, indicating that a large amount of water could be discharged to the landscape. However, where septic systems are used, daily water flows at this level would represent a significant strain on the function of onsite systems. Onsite wastewater systems for three-bedroom homes in Arizona are designed for peak flows of only 450 to 600 gpd; however, there are no design regulations for septic systems on the San Carlos Apache Reservation. Only IHS homes have septic systems built to specific design standards. Onsite systems constructed for other homes are not subject to design standards or final inspection.

Another reported cause of septic system failure is a collapsed septic tank or collapsed drainfield trench. Anecdotal reports include one case in which a barrel with holes drilled in was used as a drywell. In another case, the homeowner reported that they had a 1,250-gallon plastic “yellow tank” (as opposed to a proper septic tank) that had collapsed, and that they had installed another “yellow tank” as part of the system. Septic system design experts stipulate that such tanks require a 25 percent backfill to equalize pressure between the outside and the inside of the tank, a construction standard that would be very difficult to meet without strict oversight. It is also possible that plastic tanks not constructed for use as septic tanks or suited for underground burial are being used as septic tanks. In some cases, the tanks are pumped dry, the 25 percent backfill is lost, and the surrounding pressure from the earth collapses the tank.

These situations on the Reservation point to another wastewater challenge: only IHS-funded systems are designed and constructed to a specific standard (i.e., IHS standard details). The Phoenix Area IHS uses design standards that are aligned with the Arizona Administrative Code. There are no standards in place for onsite systems that are not funded by IHS. Moreover, no final inspection is performed to ensure that tanks, distribution systems, and soil absorption systems are constructed of proper materials at proper grades.

Resources for Repairing, Replacing, and Installing Onsite Systems

Properties on the Reservation must meet eligibility requirements to receive funding, but there may be unexpected costs for work required to make the property eligible for funding. This issue (a lack of funding for tangentially related work) affected an SDS project developed through this pilot.

In most cases, the IHS SDS has sufficient funding to assist with the replacement of onsite systems and sewer service lines for homes owned by a Tribal member. However, to be eligible for funding, homes first must be repaired to a “like new” condition. Homes constructed with grants from HUD housing programs that have not been formally transferred to the ownership of a Tribal member are not eligible for IHS funding. Additionally, businesses and homes owned by Tribal departments are not eligible for IHS funds.

The Water Infrastructure Finance Authority of Arizona (AZ WIFA), funded through the Clean Water State Revolving Fund (CWSRF) from EPA, can help address the “like new” and ownership eligibility gaps. Through this pilot, IHS helped the San Carlos Apache Tribe apply for a \$2.45 million loan through AZ WIFA to support an SDS project that will address the wastewater needs of both IHS-eligible and ineligible homes with failing onsite systems. EPA worked with IHS to include the eligible and non-eligible components of projects in the SDS list so that the entire projects can be funded (beyond what IHS can fund). The ineligible portion of the SDS project, which amounts to approximately \$1.3 million, represents the needs of 33 IHS-ineligible homes. CWSRF funds through the AZ WIFA program can support the repair or renovation of septic systems in IHS-ineligible homes (i.e., HUD homes not yet transferred to a Tribal member and homes owned by non-Tribal entities such as churches and nonprofit organizations). The San Carlos Apache Tribe can use CWSRF funds to close this \$1.3 million funding gap because the “like new” and ownership eligibility provisions limiting use of IHS funds do not apply to AZ WIFA funding. Onsite system repairs and septic-to-sewer conversions are eligible costs through the AZ WIFA program.

Under its Emerging Contaminants Fund, the AZ WIFA also provides loans to disadvantaged communities that are up to 100 percent principal forgiveness for projects that solve nonpoint source pollution issues and benefit the community (if pre-testing results indicate traces of emerging contaminants). The San Carlos Apache Tribe would likely meet requirements as a disadvantaged community for purposes of funding. Both Arizona CWSRF options can be pursued by the Tribe and the technical assistance providers, working with IHS.

To address the “like new” provisions that have created a challenge for using IHS funds, homes that were built by the San Carlos Housing Authority with HUD funds and that are not paid off by the homeowner can be repaired and funded by the Tribal Housing Authority. The Tribal Housing Authority does not have a designated budget for repairing septic systems but could fund septic projects from the overhead portion of its budget.

USDA-RD also has programs to assist homeowners with funding to make repairs, regardless of IHS or HUD status. Section 504 and 306C funding programs can be used to make appropriate repairs to the homes to bring them to standards that will make them eligible for IHS or additional USDA or San Carlos Housing Authority funding to address wastewater system repairs.

As part of this project, USDA community liaisons visited the San Carlos Apache Reservation in July 2023 to assist homeowners with grant and loan applications to address home repairs. The working session was advertised through radio, newspaper, and social media. More than 120 residents came to the session to receive assistance in completing funding applications. Moonshot Missions, a technical assistance provider, was onsite during this visit to assist residents with the application process. A USDA representative made site visits to evaluate the septic systems. This work resulted in the distribution of 86 applications over three days to Tribal residents, two of which were returned, processed, and obligated in the form of grants for \$10,000 each. USDA plans to continue this work after the pilot concludes to ensure that more homeowners obtain funding to bring their homes to “like new” condition. This outreach has been a significant positive step, but sustained effort will be required to continue the same level of engagement and support for residents.

Estimated Costs for Funding Known Failing Onsite Systems

Based on estimates from licensed septic system contractors in Gila and Graham Counties, the typical cost of a complete new septic system on the San Carlos Apache Reservation would be between \$12,000 and \$15,000 for a new 1,000-gallon tank with access risers and two 100-foot-long soil dispersal fields (drainfield trenches). Where the soil conditions require more than 200 lineal feet of drainfield trench, the cost would be higher, and the exact costs of tanks will vary based on several factors.

Service contract costs for onsite systems in the United States range from \$20 per month to \$150 per quarter. Typical service provider companies only monitor systems and do not perform pumping or repairs as part of these fees. The Black Belt Unincorporated Wastewater Program³ in Lowndes County, Alabama, implemented a septic system service model to address inadequate and nonexistent onsite wastewater treatment. This program has a \$20 per month user fee and includes septic system pumping once every 5 years. If the tank requires pumping more often, the homeowner is responsible for the cost. Currently, the cost to pump a septic tank on the San Carlos Apache Reservation ranges from \$300 to \$350 with a local company owned by a Tribal member.

When the septic tank is pumped, risers and lids should be placed over the tank inlet and outlet for future access and maintenance. The added cost for risers, adapters, and lids is approximately \$105 each from suppliers in Globe, Arizona, and Safford, Arizona.

Recommended Process for Onsite System Evaluation

The Tribe should develop a process for evaluating malfunctioning onsite systems when problems occur. The following four steps are recommended as a baseline for evaluations. Moving through these steps (and, ideally, recording results in a database, as described in Component 3) will point homeowners or the WDWTFP toward the most appropriate course of action to restore onsite systems to proper function.

1. **Determine household water usage.** If water use exceeds 450 to 600 gpd for an equivalent residential unit, leak detection and indoor conservation measures such as reducing water usage and replacing toilets, shower heads, and other plumbing fixtures should be implemented to reduce hydraulic strain on the onsite system.
2. **Check the tank and baffle for clogging.** If the problem is a plugged tank or baffle, the tank can be pumped by a licensed pumper. If risers and lids are not present, it is especially helpful to install risers and lids over the inlet and outlet after pumping to improve access for future maintenance. All lids should be secured to prevent accidental access to the tank.
3. **Check the condition of lateral (i.e., drain, dispersal) fields for ponding or settling.** If the drainfield is receiving too much hydraulic load in one area, the distribution manifold or distribution box can be excavated and leveled to evenly distribute the wastewater over the soil absorption field. If the system is hydraulically overloaded, has relatively equal distribution, and has no leaks, additional field lines should be constructed.
4. **Check the condition of the septic tank.** If a septic tank has collapsed or is inadequate, the tank should either be abandoned in place by pumping and filling with sand, or it should be removed entirely. In either case, a new tank should be installed and plumbed into the system.

It may be cost-effective to replace the entire onsite system. If this is the case, the soil should be evaluated, and a new system should be designed and constructed using current IHS standards. Depending on site conditions, an onsite professional may determine that the old soil absorption field lines can be salvaged, and an alternating valve can be installed so that the old field lines can be used after drying and recovery.

³ <https://bbuwp.org>

Systems should be inspected by a professional and/or building inspector (if available) after installation and before the system is covered with soil (i.e., buried or backfilled) to ensure that components have been installed and connected correctly. After final inspection, the system designer should create an as-built drawing of the system confirming the final locations of system components. The as-built drawing should then be submitted to the office that maintains the septic system inventory (addressed under Component 3) and permitting records, and this office should retain a copy as part of the property's records.

Component 3: Wastewater Information Coordination

Many stakeholders in this project identified a critical need for a central point of contact for wastewater system information who can act as a liaison between internal and external agencies to support proper wastewater service provision. While WDWTFP manages the sewage collection and treatment system as well as the water system, there is no designated individual, department, or entity responsible for onsite wastewater systems, and there is no central point of contact for information on available grants, maintenance practices, and regional septic system contractors.

This position would require access to a central, updated information resource with information about wastewater service at each property. Currently, most homes that are connected to the sewer collection and treatment system are known and mapped in GIS. However, the extent and condition of onsite wastewater systems is not fully documented. Therefore, it is recommended that the Tribe build a full base of information and develop a wastewater coordinator position to support better information management throughout the Reservation.

Establish a Staff or Contract Position with Responsibility for Information Management

During this pilot project, Tribal members, partner agency staff, and local leaders emphasized the need for a staff or contract position who can track and share information on wastewater services for the Tribe. An Apache-speaking individual who understands residents' repair, replacement, and funding options would create a bridge between residents and federal funding partners. Tasks assigned to this position would include:

- Maintaining a database of the type of wastewater service provided at each address or geographical identifier on the Reservation.
- Updating the 2019 septic system survey as information becomes available.
- Identifying and tracking homes without sanitation services and maintaining records of as-built drawings as they are submitted.
- Providing educational materials and active outreach as part of the education campaign described under Component 4.
- Proactively reaching out to Reservation residents who have poor or no sanitation at their homes.
- Assessing residents' eligibility for different funding sources.
- Helping residents ensure homes are in "like new" condition.
- Supporting residents and funders with the application process for IHS and especially USDA-RD funding, including information-gathering, scanning documents, and working with the Tribal government to establish property tenure.
- Coordinating regular, structured information sharing among Tribal government departments and other involved agencies, including HUD, USDA-RD, and IHS.
- Developing relationships with septic system designers and installers to make information available for residents who need service, repair, or installation.
- Developing standard details for septic systems.
- Developing and executing plans for onsite inspections of septic system construction, including new systems and repairs.

The Tribe can consider a consultant contract vehicle to set up and establish these roles and systems in the interim, with the expectation that a permanent Tribal government position will be established. USDA-RD Rural Partners funds are available and could support this effort on contract through September 2024. These funds also could be used to develop GIS and a database based on this pilot project to maintain momentum and prevent information loss after the pilot project concludes. SW EFC can assist with writing job descriptions and coordinating the hiring process.

Create an Integrated Information Record of Wastewater Service for Inhabited Structures

The Tribe's 2019 septic survey, combined with GIS information from IHS, provides a nearly complete point-in-time picture of wastewater service. This is an excellent base from which to update and expand a database on wastewater service at all occupied structures.

To help connect residents to available funding, additional information elements need development and integration, including:

- Location of occupied structures without improved water or wastewater service.
- Records of communication with residents (such as calls, complaints, or needs).
- Property tenure status (i.e., records of property leasing from the Tribe).
- USDA Section 504 and 306C grant/loan history to determine whether properties or owners have reached lifetime limits.
- IHS eligibility status (i.e., identification as HUD homes or as IHS-funding eligible).
- Water and sewer service and billing records, where applicable.

In terms of software and operational complexity, these information management needs can easily be managed in a spreadsheet. A “straw man” database starting with information from the 2019 septic system survey was prepared as part of this pilot project to facilitate this step. Additionally, the technical assistance providers developed GIS maps with all available data and can support the Tribe in maintaining and updating GIS mapping going forward.

Figures 4, 5, and 6 show the extent of the mapped area, including water lines, sewer lines, and home locations. The homes layer includes information such as owner name, sewer status, and funding sources. Also included in the GIS database (but not shown in the figures) are valves, storage tanks, water sources, service connections, pumps, water meters, disinfection stations, manholes, and lift stations.

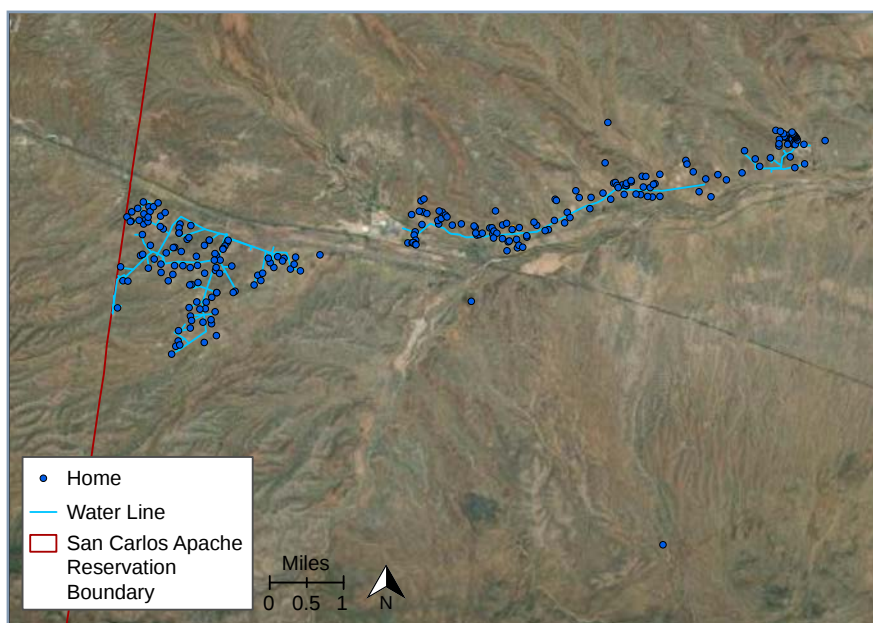


Figure 4. Mapped features, San Carlos West area.

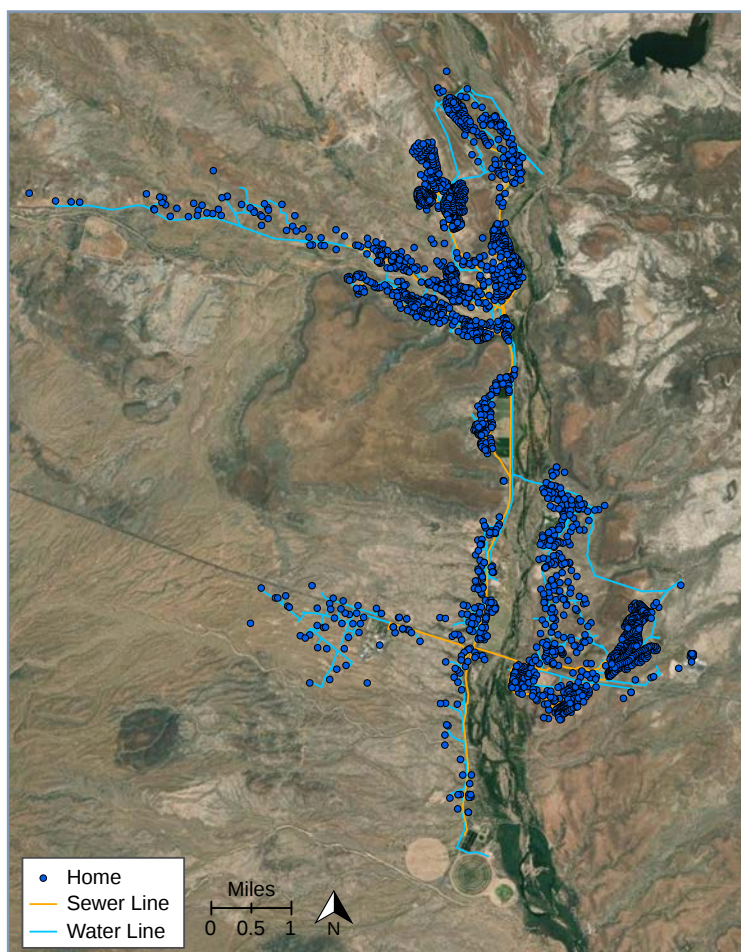


Figure 5. Mapped features, San Carlos Central area.

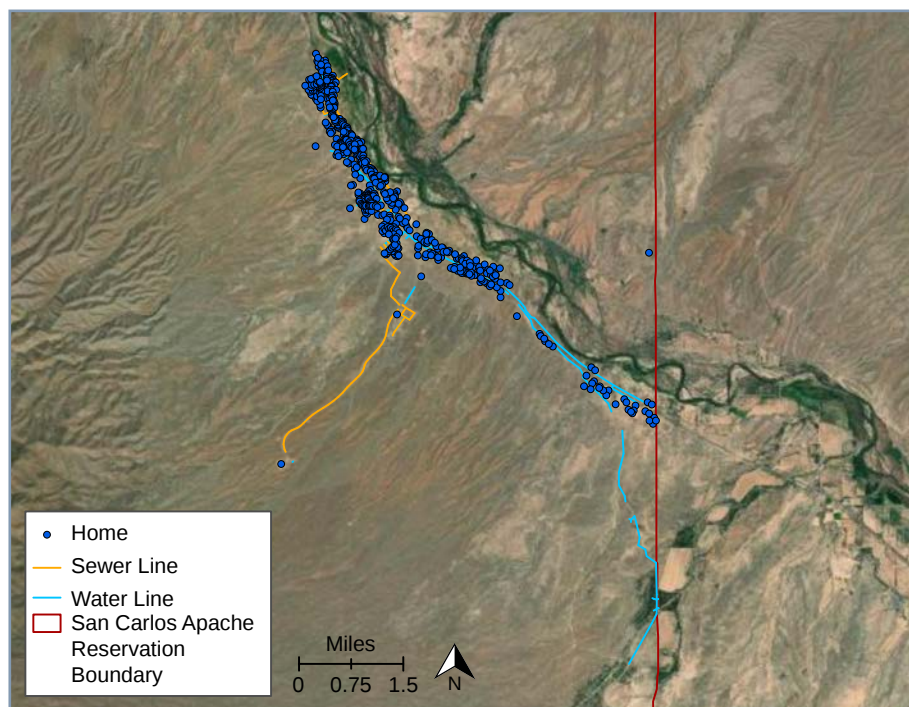


Figure 6. Mapped features, San Carlos East area.

Estimated Costs for Implementing a Wastewater Coordinator Position

Table 5 provides an estimate for adding two full-time equivalent (FTE) staffing positions, possibly within the WDWTFP or Tribal DEP, to fulfill the wastewater coordinator position outlined above and to administer a permitting system that would come with adoption of a new wastewater management ordinance, as described under Component 5. A base estimate of \$150,000 per year was used to include all costs, including salary, benefits, retirement, and ancillary costs such as training, certification, uniforms, and travel. This estimate is based on typical utility administrative staff (i.e., non-engineer) positions at utilities in the southwestern United States and can be adjusted based on the Tribe’s preferred classification for an employee at this level. It is important to note that a bachelor’s degree generally is not required for a position of this nature; a high school diploma or equivalent with appropriate training in administrative practices and information systems is typical.

Table 5. 7-Year Projection of Cost Estimates for Employing a Full-Time Wastewater Coordinator and Program Administrator (2 FTE Total)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
FTE cost ^a	\$300,000	\$312,000	\$324,480	\$337,459	\$350,958	\$364,996	\$379,596

^a FTE cost assumes a 4% annual inflation rate.

Component 4: Develop an Active Education and Outreach Program

To ensure the long-term function of onsite wastewater systems, those using the systems should understand proper septic system use. A lack of proper septic system care can lead to system failures and adverse health conditions for people living on the Reservation.

To improve stewardship and system performance, an active and urgent education campaign should be developed and delivered through multiple communication pathways. There are many models for effective septic system education programs; a common element among effective programs is cultural relevance. During the pilot project, the team identified three areas of educational focus as especially important:

1. **Preventing damage from fats, oils, and grease.** Anecdotal and engineering reports show that a significant number of septic systems on the Reservation are compromised by the introduction of fats, oils, and grease into septic systems, which leads to pipe clogging, backups, drainfield clogging, and overall system malfunction. Effective prevention is behavior-centered: residents should consistently divert cooking grease away from kitchen drains. Residents can be encouraged to adopt these behaviors through multiple education modes, including school-based education; consistent messaging from a wastewater utility (including social media and radio public service announcements, which are especially important communication pathways for the Tribe); and distribution of grease containers with specific instructions on how to properly dispose of fats, oils, and grease. Instructions should be directly relevant to the types of foods, oils, and techniques that people on the Reservation use from day to day.

Developing and implementing a fats, oils, and grease prevention campaign is strongly recommended as a priority activity for the Tribe and technical assistance providers. The campaign should be generated through a co-creation process that yields realistic and culturally relevant materials. Collaboration with the University of Arizona Extension agent on the San Carlos Apache Reservation is strongly recommended. Messaging should start at the beginning: helping Tribal members understand the “why” before moving on to the “how.” This should be an ongoing campaign that evolves over time and integrates into regular communication from the Tribal authorities to the community.

2. **Addressing septic clogs and backups.** Community members need information on steps to take when sanitary drains (i.e., bathtubs and showers, toilets, sinks) are clogged and when water ponds over a septic tank or drainfield. The initial workshop revealed that many community members are unaware of the potential health impacts from backups and effluent exposure. Information is not consistently provided to residents, which increases their chances of being exposed to insufficiently treated sewage.

An initial education campaign should focus on general awareness of health risks associated with exposure. The campaign should encourage residents to contact the WDWTFP or a qualified drain repair, septic system repair, or pumping company in the region to address problems. Residents could also consult the coordinating staff member discussed in Component 3. The educational campaign should describe how to get financial assistance to repair or replace a septic system and include resources to help homeowners complete grant and loan applications. Ideally, there would also be a Tribal fund for indigent households who need an immediate health risk abated.

3. **Promoting water conservation.** Water conservation protects the longevity and function of septic systems. Customers connected to the Tribal water system have very high average monthly consumption rates per household. Tribal policies that exempt households headed by older adults from paying water bills tend to discourage conservation, since water is “free” to residents. Therefore, an active water conservation campaign—potentially coupled with information on rainwater capture or graywater use for households with onsite laundry—would benefit both the water system and the function of septic systems across the Reservation. This campaign effort should be integrated into regular Tribal activities and emphasized by multiple departments. If rainwater capture and graywater use is implemented, the Tribe will need to develop standards and regulations for non-potable water uses.

In response to the outreach needs described above, the DEP developed an outline for the first 2 years of a communications plan. The plan would incorporate Facebook, radio, posters and flyers, refrigerator magnets, stickers, household surveys, one-on-one outreach, and booklets on maintenance and repair. While the DEP would lead the effort, it will be necessary for all Tribal departments to incorporate messaging through their own outreach activities. This is especially true for IHS and the Tribal Housing Authority.

Months 1–3: Focusing the Audience

In this initial phase, Tribal members will be introduced to the issue through a series of “fun facts” and other engaging information to ease residents into a topic that they may be unfamiliar with. Postings may include general information, such as:

- “The appliance that uses the most water in the home is the toilet.”
- “433 million miles of toilet paper are used in America every year!”

Months 4–8: Building Awareness

Messaging will shift to education on Tribal and septic-specific issues. Other messages will explain the difference between sewer and septic, how they work, and where waste goes once the toilet is flushed. This phase will help members understand the health impacts of wastewater exposure.

Months 9–12: Moving to Action

Communication efforts will shift to educating Tribal members on septic and sewer best practices. Messages focused on different audiences could include how to find the septic tank and leach field; how and why to use less water; why fats, oils, and grease do not belong in pipes; and why to avoid planting gardens and trees in a leach field. Messaging will also discuss when a septic system needs maintenance.

Months 13–24: Helping Members Help Themselves

Tribal members will be introduced to videos and new messages that teach septic maintenance, installation compliance, water conservation, and how to keep a maintenance log.

Throughout this campaign and into the future, all media and visuals will be tailored to the San Carlos Apache Tribe and reflect the lives of the people who live on the Reservation.

Component 5: Reinvigorate Wastewater and Water Governance Structures, and Update Rates

Governance structures and financial incentives set by the managing utility (in this case, the WDWTFP and the Tribal Council) can help ensure proper septic system installation and maintenance, appropriate use of the central sewer system, and efficient water use. During this project, there was significant uncertainty about the presence of a Tribal ordinance governing water and wastewater system use. The recent enactment of a comprehensive, updated solid waste ordinance (No. JN-28-039, adopted June 2023) provides an excellent template either for a new, comprehensive ordinance governing sewer connections and onsite systems or for an updated and enhanced ordinance. Models from jurisdictions that manage both onsite and central sewer/water systems demonstrate that communities can develop effective programs for comprehensive wastewater management.

WDWTFP's wastewater ordinance should be structured to govern three core elements:

1. **Connection and discharges to the central sewer system**, including connection fees, waste discharge parameters, and establishment of a capital reserve.
2. **Standards for the design, installation, and periodic maintenance of onsite wastewater systems**, including permitting procedures; recording of as-built plans; and an enforceable abatement procedure for instances of surfacing sewage, system malfunction, occupancy without sanitation, and other situations that create a hazard for public health.
3. **A system of rates and charges**, including non-fee revenues, structured to ensure sufficient revenue for effective operations of the system and provisions for fee recovery in the event of non-payment. This section also would address the use of non-fee revenues, which can support customer assistance.

The Tribe's experience with water rates shows how an effective, conservation-based rate structure can improve water consumption—which, by extension, would help preserve the life of septic systems. A rate analysis of the water and wastewater systems is currently underway and scheduled for completion in 2024. The metered, usage-based, tiered billing structure showed that 97.5 million gallons less water was used over a 7-month period in 2005 compared with the same period in 2006, when the flat-rate billing was implemented. Therefore, resuming a usage-based, tiered structure is likely to be the best solution for overall utility sustainability.

There are several outstanding questions regarding a 2015 rate analysis, also referenced in the PER, that indicated that the Tribe should consider a rate of \$15 per month for sewer for residential customers. Elders connected to water and sewer are not billed. The 2015 rate analysis indicated that prior to the adoption of a policy exempting elders from payment, many households were disconnected from water service for non-payment, so there may be concern about instances of non-payment among Tribal members if rates are added or increased.

Funding Opportunities

The Bipartisan Infrastructure Law provides additional funding to the CWSRF for loans and grants to small, rural, and disadvantaged communities that can be leveraged with USDA-RD funds to address inadequate water and wastewater systems. There are multiple potential funding sources for the San Carlos Apache Tribe, including USDA-RD, IHS, the CWISA program (administered by EPA Region 9), and the Arizona CWSRF (administered by AZ WIFA). Table 6 provides a summary of funding sources, eligible uses, and key constraints and limitations.

Table 6. Relevant Funding Sources for the San Carlos Apache Tribe

Funding Source	Eligible Uses	Key Constraints and Limitations
USDA 504 grants	Loans for very-low-income homeowners to repair, improve, or modernize their homes; grants for elderly very-low-income homeowners to remove health and safety hazards.	Grants: must be age 62 or older and not be able to repay a repair loan. Lifetime limit of \$10,000.
USDA 306C loans	Grants to develop water and waste disposal systems in rural areas with populations of 10,000 or fewer. Available for individuals as well.	Individuals must be in a colonia located in a rural area. Lifetime assistance for an individual may not exceed \$5,000. No age limit requirement.
USDA Water and Waste Disposal Loan and Grant Program	Loan/grant funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas.	Must be in Tribal lands in rural areas, colonias, or rural areas with populations of 10,000 or fewer; entity must be state/local government, federally recognized Tribe, or nonprofit.
IHS “housing” funds	Funds for installation of onsite wastewater systems or connection to centralized sewer for “like new” homes.	HUD-funded homes (“HUD homes”) are not eligible. Homes previously served by IHS are not eligible. Non-HUD Tribal member-owned homes must be in “like new” condition.
IHS “regular” funds: SDS	Funds for repair/replacement of onsite wastewater systems, connection to centralized sewer, and community-wide infrastructure improvements.	Funding process through SDS takes 1 year minimum. HUD-funded homes are not eligible. Tribal member-owned homes must be in “like new” condition.
IHS collaboration with EPA and CWISA funding	Funds for repair/replacement of onsite wastewater systems, connection to centralized sewer, and community-wide infrastructure improvements. Funding available for IHS-ineligible homes.	Funding process through SDS takes 1 year minimum. Requires application and priority list inclusion. Multi-year.
Arizona CWSRF	Loan program that offers up to 100% loan forgiveness for certain projects in disadvantaged communities. Septic repair/renovation projects are eligible for 100% loan forgiveness only if pre-testing indicates the presence of emerging contaminants resulting from nonpoint source pollution.	To be eligible for loan forgiveness, a community must be either disadvantaged or submitting a green project. If a community is disadvantaged, the loan is eligible for 50% loan forgiveness. Projects up to \$250,000 resolving nonpoint source pollution (i.e., renovating septic systems) are eligible for 100% loan forgiveness.

Overview of USDA's Rural Development Water and Environmental Programs: Water and Waste Disposal Loans and Grants

- Through Rural Utilities Service Water and Environmental Programs and the Native American Set Aside for infrastructure projects, Tribal communities can obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems.
- The Water and Waste Disposal Loan and Grant Program provides long-term, low-interest loans for terms up to 40 years to Tribes, state and local government entities, and nonprofits in rural areas with populations under 10,000. If funds are available, a grant may be combined with a loan to keep user costs reasonable. Financial audits are required for USDA-RD loans and grants in years when more than \$750,000 of federal funds are expended, along with a commitment from the Tribe for revenue collection during the life of the loan.
- The Section 306C Water and Waste Disposal Grants Program provides 100 percent grant funding to low-income individuals who own homes on Tribal lands, colonias, or rural areas, and towns with populations of 10,000 or fewer.
- USDA-RD's Single-Family Housing Repair Loans and Grants program (also known as the Section 504 Home Repair Program) provides loans to very-low-income homeowners to repair, improve, or modernize their homes. It also provides grants to elderly, very-low-income homeowners to remove health and safety hazards.
 - To be eligible for grants, homeowners must be age 62 or older.
- Funds may be used to finance the acquisition, construction, or improvement of:
 - Drinking water sourcing, treatment, storage, and distribution.
 - Sewer collection, transmission, treatment, and disposal.
 - Solid waste collection, disposal, and closure.
 - Stormwater collection, transmission, and disposal.
- USDA-RD accepts applications year-round on a rolling basis.

Overview of IHS Programs

- IHS receives an appropriation of “housing” dollars each year to address individual water and sanitation deficiencies for IHS-eligible homes. The amount of funding received per year varies based on the projected need for each Tribe but has ranged from \$200,000 to \$600,000 per year.
 - To be eligible to receive housing dollars, the Tribal member-owned home must be in “like new” condition and the homeowner must not have received funding from IHS for water and/or sewer services for that home in the past. If homes are considered eligible for IHS housing funds, turnaround time from completed application to installed services is usually 3 to 6 months for conventional systems, depending on the availability of the local Tribal construction crew.
 - Designs that require water or sewer main extensions or are otherwise more complex may take up to 1 year to complete due to additional factors (e.g., engineering time required for detailed design, material lead times, right-of-way encroachment permits, archaeological and environmental surveys, floodplain analyses).
 - The IHS Office of Environmental Health and Engineering in San Carlos typically serves 10 to 15 homes per year with individual water and/or sewer services.
- When individual sites have been served by IHS in the past and are not eligible for IHS housing funds, they may be eligible for IHS regular funds through the IHS SDS.
 - Once homes with malfunctioning onsite wastewater treatment systems are identified, they can be “bundled” and addressed through a project in the IHS SDS. IHS SDS projects can also be developed to solve deficiencies in centralized water and sewer systems, such as with the San Carlos Regional Wastewater Treatment Facility expansion project.

Overview of the CWISA Program Administered by EPA Region 9 With Support From IHS

- The CWISA program provides funding to Indian Tribes and Alaska Native Villages for wastewater infrastructure. The CWISA program is administered in cooperation with IHS.
- To be considered for CWISA program funding, Tribes must identify their wastewater needs to the IHS SDS. EPA is required to use the IHS SDS priority lists to identify and select projects for CWISA program funding.
- Two types of activities relevant to this project could be eligible for funding through the CWISA program: (1) additional expansion or enhancement of the central sewer system; and (2) installation, repair, or replacement of onsite systems.
- CWISA funds can provide services to facilities with existing deficiencies, including IHS-ineligible businesses and homes such as those constructed with the San Carlos Housing Authority funds and under the management of the San Carlos Housing Authority.
- A proposed project to replace failed onsite wastewater systems can be developed for the IHS SDS system with a listed pro-rata share for IHS-ineligible facilities. With this proposed project in SDS, EPA can allocate funding based on the need for services to IHS-ineligible facilities.
- CWISA requires a long lead time and extensive administrative process, including listing a project through the IHS SDS list and securing available funds for a particular fiscal year. However, if a project is scoped that would work with the requisite lead time, CWISA could provide substantial capital funding. One option could be development of a CWISA-funded loan or loan/grant fund for septic system installation, repair, or upgrades.

Overview of the Arizona CWSRF Program Administered by AZ WIFA

- The Arizona CWSRF is a low-interest loan program intended to finance public infrastructure improvements.
- The maximum amounts are determined based on (1) the loan amount, (2) the borrower's qualification as disadvantaged, (3) the project's qualification for Green Project Reserve, (4) the borrower's proactivity in increasing rates to support debt servicing, and (5) the borrower's history of receiving prior forgivable principal awards. Those maximum amounts are:
 - Up to 100 percent for a disadvantaged community solving a nonpoint source pollution problem with an application for \$250,000 or less.
 - Up to 60 percent for communities with high unemployment and declining population rates.
 - Up to 50 percent for communities that qualify as disadvantaged.
 - Up to 20 percent for green projects and stormwater projects.
- Disadvantaged community criteria include any of the following:
 - Communities designated as colonias through the federal government.
 - Communities that receive 50 or more local fiscal capacity (LFC) points on their project priority list application.
 - Communities with an area median household income (MHI) of 90 percent or less of the state MHI.
- The LFC calculation is based on MHI, user rates, and debt per connection. Communities with low MHIs, high water/wastewater rates, high levels of existing/proposed debt, and low population levels will have more LFC points.
- Arizona establishes its Intended Use Plan and current year priorities for this program in June each year. The state accepts applications year-round on a rolling basis.
- The loan term is generally 20 years, and the interest rate is below market. The interest rate is adjusted annually.



Benefits of Investing in Adequate Wastewater Infrastructure

Public and Community Health Improvement

Exposure to sewage can have negative health impacts and spread diseases such as salmonellosis, shigellosis, cholera, giardiasis, amoebiasis, hepatitis A, viral enteritis, and other diarrheal diseases.⁴ There are many different types of microbes in wastewater, which makes it challenging to determine specific causes of illness. Detecting and identifying microbes in wastewater takes time and resources.⁵ However, it is well known that exposure to untreated waste negatively affects residents' health and well-being.

Investing in adequate wastewater infrastructure creates a healthier environment for the residents of the San Carlos Apache Reservation. Children can play outdoors, residents do not have to worry about their families and pets encountering raw sewage, household plumbing is more functional, and sewage odors are not persistently present. Well-maintained and properly built wastewater treatment systems protect residents from viruses and bacteria. They also reduce environmental pollution, function during rain and storms, and provide a foundation for economic development.

Economic Impact of Wastewater Infrastructure Investment

Developing wastewater systems can bring economic benefits and jobs for communities. The *Economic Benefits of Investing in Water Infrastructure* study, commissioned by the Value of Water Campaign and completed by the U.S. Water Alliance in 2017, found that for every \$1 million spent on infrastructure construction, over 15 jobs are generated. Leaders for the San Carlos Apache Tribe will want to consider school apprenticeship programs and other local workforce development programs, including local water or construction-related skills, to create local opportunities for residents once construction-related activities begin.

New businesses can bring jobs to reduce the number of residents who commute out of the Reservation for work. Gravity sewers and centralized treatment are the most flexible wastewater systems for economic development. However, they are also the most expensive to build and maintain at first. Community systems can also be attractive to prospective businesses if the design accounts for the expected flow.

4 World Health Organization. (2006). *WHO guidelines for the safe use of wastewater, excreta and greywater* (Vol. 2). <https://www.who.int/publications/i/item/9241546832>

5 Kaushal, S., & Singh, J. S. (2017). Wastewater impact on human health and microorganism-mediated remediation and treatment through technologies. In J. Singh & G. Seneviratne (Eds.), *Agro-environmental sustainability*. Springer. https://doi.org/10.1007/978-3-319-49727-3_12

Sustaining the Investment Through Operations and Maintenance

The San Carlos Apache Tribe will likely expand their centralized wastewater infrastructure to increase the size of their lagoons and connect homes in Bylas to the system. As a result of this pilot initiative, homes identified in the 2019 septic survey have been categorized in the IHS SDS list based on their eligibility for IHS versus CWISA funding. A campaign to tailor septic system educational materials for homeowners based on the Tribe's needs is currently in development. For the infrastructure investments and direct repairs to home septic systems to have a long-term impact, they should be accompanied by policy changes and educational outreach.

Ultimately, the sustainability of any of these approaches will rely on the San Carlos Apache Tribe taking an active role in providing information, connections, and services to residents on the Reservation.

Neither the community sewage treatment system nor the onsite septic systems can be sustainable if excessive water usage on the Reservation continues. As noted earlier, there are reported cases of homes using 2,500 gpd, which has severe detrimental effects on wastewater systems. Community engagement efforts should address all excessive water usage to reduce the incidence of onsite system failure.

Septic System Maintenance and Care

This project identified a critical need for improved education for residents on proper care of septic and sewer systems; water conservation; and what to do if a system backs up, surfaces, or otherwise malfunctions. Component 4 outlines specific considerations for an education program. Partnering with technical assistance providers and especially with the University of Arizona Extension is recommended.

The Tribe should develop an intentional, annual budget and goals for community water education. An active education campaign would build on the successful first steps taken through the 2019 septic system survey and the many engagement steps taken through the pilot program.

Community Education in Practice

A recent landscape maintenance campaign by Honolulu's Storm Water Quality program offers an example of effective education. The campaign was intended to ensure that landscape maintenance professionals did not sweep or blow yard trimmings and other green waste into storm drains, which had been a persistent problem. After surveying and conducting focus groups in Ilokano, the dialect spoken by a sizable majority of landscape professionals, a jingle was written and set to the tune of a familiar Philippine folk song using the phrase "keep the greens out of the 'big hole'"—the best Ilokano phrase for the storm drains in the street. The jingle ran on a local Ilokano radio station. Post-campaign surveys at fairs and on social media demonstrated strong awareness and knowledge: participants noted that "everyone knew the song." This type of community education could be especially effective with the San Carlos Apache community.

Improving the Quality of Onsite Systems

A new rate analysis is underway, and a comprehensive ordinance could be developed to implement the recommended rates and facilitate consistent billing. As discussed under Component 5, an ordinance governing the design, installation, and operation of all wastewater systems should be considered. A comprehensive ordinance would include the following:

- A requirement that occupied structures have improved sanitary sewer service.
- Language that grants a Tribal entity authority over central water and sewer system connections when connections are required.
- Financial requirements such as fees and rate structures (typically annual rates are adopted by resolution and incorporated by reference into the ordinance).
- A requirement that septic system design and installation standards be followed.
- A requirement that septic systems be inspected after construction and before being “covered.”
- Standards for sewer and septic system use, including penalties for misuse resulting in damage or health hazards.

Support can be provided by regional organizations such as the Arizona Onsite Wastewater Reclamation Association and neighboring counties.⁶ Also, the Arizona Department of Environmental Quality is available for consultation and advice regarding proper ordinances and standards, as well as the process for adopting standards.⁷

Improving Utility Sustainability

A water and sewer utility needs sufficient revenues to deliver consistent service to its customers. The Tribal utility’s revenues are estimated at roughly \$515,000 per year. This amount is likely insufficient for full O&M, and too low to implement the information management, education, and community liaison/coordinator activities recommended in this document. Therefore, implementing the water and sewer utility rates recommended in the forthcoming rate analysis, and continuing to pursue and connect to external funding, will be critical to financial sustainability. The Tribe should also consider setting aside a designated fund to match external funding resources.

It is recommended that the Tribe reconsider exempting certain households from paying any water and sewer utility costs. As noted under the education discussion, when water is “free,” conservation—which is critical to preserving the function of onsite systems—is discouraged. Even a token water and sewer bill can ensure that customer use is tracked and that customers maintain awareness of the cost and value of water and sewer service. An education campaign could include straightforward information on the cost of providing and maintaining water and sewer service.

Addressing the Affordability Challenge

It is possible to lower the financial burden of these investments, especially for low-income households. Some local communities and states are developing affordability programs to provide rate assistance to low-income customers. The Low Income Household Water Assistance Program, created in response to the COVID-19 pandemic, was the first program of its kind in the United States, but it is only authorized by Congress through 2024. It is unclear whether Congress or the State of Arizona will continue this program.

⁶ <https://www.azowra.org/>

⁷ <https://www.azdeq.gov/>

The San Carlos Apache Tribe, like other Tribal governments and utilities, can build local affordability programs by charging different rates on commercial accounts, new customers, or other customer bases that incorporate funding for a local affordability program. Using different rates creates a pot of money to help other customers during times of need. Customers who have a temporary medical issue or qualify for assistance based on income guidelines can take advantage of this rate structure to pay for water and wastewater services. However, this solution might not work if the San Carlos Apache Tribe does not have many commercial or industrial accounts to pay extra to fund it.

The San Carlos Apache Tribe will need multiple approaches to address the financial burden of water utilities for low-income residents, beyond just the programs discussed above. For example, the Tribe could consider non-rate revenue opportunities such as leasing space on water towers or offering non-traditional services. These could include providing construction services to new projects related to the utilities connections and charging for the time, although this would require contract documents with the private sector.

Key Takeaways on Affordability

All the wastewater treatment options have a high financial impact on the lowest-income members of the San Carlos Apache Tribe. **Rate assistance programs may be necessary for some households on the San Carlos Apache Reservation.**

Loan repayments will cause any option to have a high financial impact on San Carlos Apache Tribe members. The Tribe will need to work with the funding agencies to **maximize the amount of grants** for constructing their wastewater system.

Economic growth can lower monthly costs of central treatment systems; therefore, **the Tribe should carefully weigh multiple factors in deciding on a system.**

Partners and Roles

The path to clean water is not an easy one. Many partners in this pilot program will continue to support the San Carlos Apache Tribe as it implements the components of the comprehensive wastewater management plan (Figure 7), including:

- **U.S. Department of Agriculture Rural Development (USDA-RD).** Lead agency (with EPA) providing jointly leveraged technical assistance resources in this pilot program. Funding partner.
- **U.S. Environmental Protection Agency (EPA) Headquarters and Region 9.** Lead agency (with USDA) providing jointly leveraged technical assistance resources in this pilot program.
- **Indian Health Service (IHS).** Federal agency partner providing financial and technical resources.
- **Southwest Environmental Finance Center (SW EFC).** Technical assistance provider that will assist with the technical, managerial, and financial aspects of the Tribe's environmental services.
- **Moonshot Missions.** Technical assistance provider that will provide onsite guidance and managerial support to the Tribe's environmental departments.
- **Environmental Finance Center West (EFC West).** Technical assistance provider that will support the Tribe in community engagement and capacity building efforts.

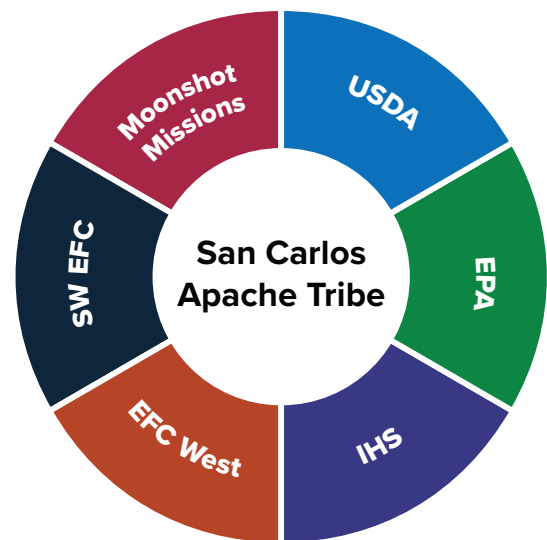


Figure 7. Partners to the San Carlos Apache Tribe.

Technical Assistance and Support for the San Carlos Apache Tribe Moving Forward

Both EPA and USDA-RD fund technical assistance programs that support small, rural, and disadvantaged communities and Tribes and help them navigate the IHS SDS, CWSRF, Drinking Water State Revolving Fund (DWSRF), and USDA-RD funding programs. The ultimate goals of the technical assistance programs are to help communities identify water challenges and solutions, build capacity to address those needs, and develop application materials to access water infrastructure funding. Technical assistance providers can help the San Carlos Apache Tribe understand the funding available through the SRF and USDA-RD programs, as well as deadlines and application requirements. **EPA WaterTA and USDA-RD TA can also assist with preparing and submitting funding applications.** These providers can offer advice as communities consider infrastructure options, financing, and rate structures. Their connections with EPA and USDA-RD can help Tribes successfully complete projects and programs. Other technical assistance support for San Carlos Apache Tribe can include:

- **Developing a wastewater rate program to build a local “affordability assistance” and asset management program.** The San Carlos Apache Tribe could establish a rate program where new, commercial, or industrial customers contribute to an affordability assistance program for low-income residents. EPA’s network of Environmental Finance Centers partners with technical assistance providers that specialize in these types of rate programs.
- **Supporting workforce development and staff training.** The Tribal WDWTFP and DEP will need additional operations staff and employees to assist with an educational campaign. The technical assistance providers have staff training programs available.
- **Engaging residents in the needs and benefits of a wastewater treatment system.** Customers play a large part in the success of a wastewater treatment system. Technical assistance providers can help with engagement and education for residents on topics such as “What Not to Flush”; “Management of Fats, Oils, and Greases”; why having a wastewater system is important; and how to maintain a septic system. Educational materials are available for residents.
- **Educating residents about the importance of water conservation.** An educational program can help customers reduce water use, which supports O&M needs and keeps service costs lower. Technical assistance providers can assist in educating customers on the importance of repairing leaking fixtures and other water conservation mechanisms.
- **Developing a wastewater management ordinance.** Adopting basic standards for septic system design, installation, and maintenance would help the Tribe prevent issues with system failures. Technical assistance providers can assist in developing comprehensive ordinance language.

More information can be found at EPA’s WaterTA website.⁸

⁸ <https://www.epa.gov/waterta>

Road Map for Implementation

The Tribal DEP is developing a strategy for addressing the Tribe’s wastewater treatment needs, but this is just the beginning of the process. Developing a governance structure takes time. Creating a holistic program to address septic system needs could take 2 or more years. These issues are not easy to resolve, but the effort is worthwhile for the future of the community. Now is the best time in decades to act, as Bipartisan Infrastructure Law funds add a boost to water infrastructure across the United States. Over the next year, the San Carlos Apache Tribe will need to consider options and determine the best path for their future.

Funding Opportunities for Implementation

Table 7 maps potential funding sources identified by the project team to the recommendations detailed in this report.

Table 7. Clean Water Options and Funding Sources

Recommendation	Funding Source
Through IHS, complete planned sewer system upgrade and expansion.	Combination of funds from IHS, Arizona CWSRF, and EPA Region 9
Install, fix, and repair onsite systems.	- USDA 504 and 306C grants to get homes to “like new” status required for IHS funds - IHS SDS funding - EPA CWISA funds - If required, Arizona CWSRF - Moonshot Missions sourcing funds for septic pumping services
Establish a staff or contract position for information management and connecting residents to septic system funding and resources.	Research needed to identify appropriate USDA-RD funding source
Develop an active education and outreach program.	- Potential AmeriCorps VISTA position - Technical assistance providers supporting community education efforts
Develop the wastewater management ordinance.	Technical assistance providers supporting the development of ordinance language

Concluding Thoughts

As the San Carlos Apache Tribe moves forward with an in-depth analysis of its options for wastewater service, EPA and USDA-RD staff and technical assistance providers are ready to support the community with funding opportunities through the Bipartisan Infrastructure Law. This is a historic time for water infrastructure funding for Tribes such as the San Carlos Apache. New funding can help the San Carlos Apache Tribe address their current and persistent health challenges and build a prosperous future.

Definitions

Central wastewater treatment facility. A wastewater treatment system that is larger than 15,000 gallons per day and permitted through the San Carlos Apache Tribe. It usually has a surface water discharge permit to discharge treated water into a river. Certified operating staff and monitoring is required for these systems.

Community or cluster treatment system. A small wastewater treatment system of less than 15,000 gpd with a drainfield for subsurface discharge.

Gravity sewer system. A system that includes a sewer lateral connected to the house and sewer lines that flow by gravity to pump station(s) that pump the flow to a treatment plant.

Onsite/septic system. A traditional system includes a settling (septic) tank and drainfield. Advanced or engineered systems can include aeration systems, chemical dosing, and a sand filtration system for the drainfield.

Water Distribution and Wastewater Treatment Facilities Program (WDWTFP). The centralized water and wastewater utility for the San Carlos Apache Tribe.



Limitations

Any systems and associated cost estimates discussed in this draft analysis are preliminary and not intended to serve in lieu of a Preliminary Engineering Report prepared by a professional engineer licensed in the relevant jurisdiction.

Alternatives have been developed at a high level with desktop tools and have not been informed with field reconnaissance work. Further field evaluation is needed to verify these alternatives in subsequent work following this assessment and solutions plan.

Treatment and dispersal systems designed by licensed design professionals are based on soil evaluations, flood elevation evaluations and variances, permitted discharge limit determinations, and unforeseen factors that cannot be determined without onsite field surveys and evaluations beyond the scope of this draft assessment.